easterly gale was experienced on the 23d off Acapulco, a moderate gale in the Gulf of Tehuantepec on the 24th, and a fresh easterly gale on the same date off central Lower California. Aside from these, no gales were reported from the entire ocean south of the thirtieth parallel.

Winds at Honolulu.—While there were some southerly winds at Honolulu early in June, due to the depression then west and northwest of the Hawaiian Islands, the prevailing direction for the month was east, with the maximum velocity, 24 miles from the east, on the 22d.

Fog.—In the average year fog increases greatly in frequency and extent over the upper waters of the North Pacific, especially along the western part of the routes, during June. This year the June percentage of fog was slightly less than in the previous May over the region of the summer fog bank lying east and southeast of the Kuril Islands, except in the 5° square, 43° to 48° N., 155° to 160° E., where it occurred on 10 days, or with about its frequency in the previous month. Along the middle part of the upper routes the occurrence was light, but south of the Gulf of Alaska, from longitude 150° W. to the coast, it was encountered on three to five days in each 5° square. The heaviest coastal occurrence was between Eureka and San Diego, where it was reported on nine days. Farther southward it was met with occasionally to Cape San Lucas. In mid-ocean, between 30° and 35° N., 165° E. to 165° W., fog was unusually frequent, forming here and there along the strip from the 17th to the 27th.

Volcanic phenomena.—The British steamer *Narenta* was in port of San Jose de Guatemala during the day of June 5. Mr. C. K. Brown, third officer of the vessel, on this day reported: "Volcano Isalco in eruption. Lava flowing freely down side like a waterfall. Visible at 50 miles through rain."

Mr. F. E. Holmes, observer on the American steamer *Victoria*, reported in June (date not given, but between the 8th and the 26th): "While laying at the dock at False Pass, Alaska, latitude 54° 51′ N., longitude 163° 22′ W., noted some fine brown sand or lava falling, evidently from Volcano Shishaldin."

BUCKET OBSERVATIONS OF SEA-SURFACE TEMPERATURES

By GILES SLOCUM

STRAITS OF FLORIDA AND CARIBBEAN SEA

The temperatures herein published are the means of the average temperatures for the four quarters of the month, except that, in the case of the 5° subdivisions of the Caribbean Sea, the figures shown are the simple means of the observed temperatures with the entire month taken as a unit. Table 1 shows the lengths of the quarters for each length of month.

Table 2 shows the average temperature for the Caribbean Sea and the Straits of Florida for June of each year from 1919 to 1930, inclusive, and Table 3 summarizes the temperature for the month in the same areas, including the departures of the June, 1930, means from the 11-year means for June, 1920–1930, and the changes from the temperatures for the preceding month of May, 1930.

The chart shows the number of observations taken during the month of June, 1930, within each 1° square; the mean temperature of the Straits of Florida, and of each 5° [1] subdivision of the Caribbean Sea; the 11-year means (1920–1930) for these areas; and the local mean time corresponding to Greenwich mean noon, at which time the mariners are instructed to make the temperature readings.

June marks the end of what may be called the cool season in the Caribbean Sea. From the 1st to about the middle of the month, under average conditions, the seasonal march of sea-surface temperatures continues to exhibit nearly as strong an upward trend as that found in May, but this rapid rise does not continue through the rest of the month. Instead, it becomes more gradual than is found in the first half of June, in the spring weeks, or in the late summer. The Straits of Florida region, hitherto cooler than the Caribbean Sea, becomes the warmer of the two areas, with the time of the reversal in relative temperature varying from early June to near the beginning of July.

In average years within the Straits of Florida, June is the month of most rapid rise in temperature during the entire year, with the 11 years' record showing no June as cool as the warmest May.

Comparing the two areas by quarter months, the Caribbean has usually been warmer than the Straits during the first quarter of June; as often the cooler as the warmer during the second quarter, although its temperature averages slightly higher for the 11 years; cooler than the Straits during the third quarter, with exceptions in 1926 and 1930; and at no time warmer during the fourth quarter, unless the doubtful case of 1919, when observations were few, be included. In the Straits of Florida the third and fourth quarters of June have thus been almost uniformly periods when the surface water was distinctly warmer there than in the Caribbean Sea, with the result that the Straits show a higher mean temperature for the month.

In June, 1930, the Caribbean Sea was somewhat cooler than average east of the seventieth meridian, close to the average in the Cuba-Jamaica region and north of the eastern Colombia coast, and warmer than the 11 year mean over the rest of the sea, with the plus departures large in Central American waters. The fourth quarter of June was cooler than the third over the region east of the seventy-fifth meridian, and in that area west of this longitude and south of the fifteenth parallel. For the fourth successive month the mean temperature of the sea as a whole was somewhat above the seasonal average.

In the Straits of Florida, June was notably an abnormal month. The observational readings for the first and fourth quarters gave computed mean temperatures well below the usual values, while those for the second and third quarters and for the month as a whole averaged the lowest for these periods since records began.

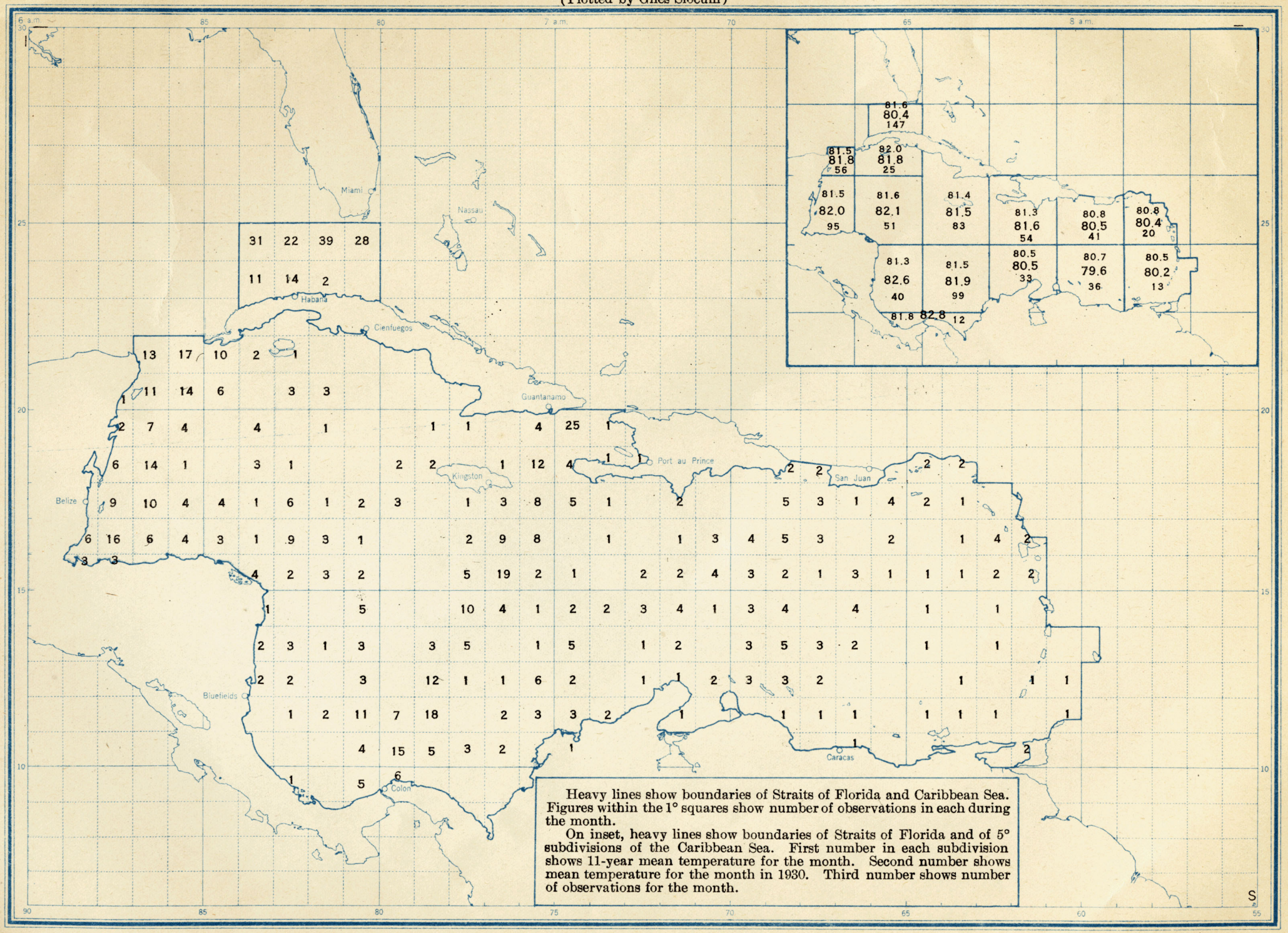
This coolest June in the Straits area followed a month with sea-surface temperatures, within the range of statistical possible error arising from limited size of samples, as high as in any preceding May, the difference between these two months in 1930 being only 0.8°. The smallness of this May-to-June range in temperature constitutes another record without precedent or near approach. The anomaly of this near approach to equality between the two monthly temperatures becomes increasingly manifest when the 0.8° difference is contrasted with the mean range of 2.9° between May and June for the 10-year period of 1920 to 1929.

No theory is offered in explanation for, or in support of, a cause-and-effect relation between the cool water in June in the Straits of Florida and the 1930 drought. The period covered by sea-surface temperature records in workable volume includes only a few recent years, and

[1] In 3 cases, as indicated on the chart, the observations from small, little traveled, and unimportant areas at the outer limits of the Caribbean Sea have been treated as parts of contiguous 5° subdivisions.

Distribution of Greenwich Mean Noon Bucket Observations of Sea-Surface Temperatures, June, 1930

(Plotted by Giles Slocum)



Heavy lines show boundaries of Straits of Florida and Caribbean Sea. Figures within the 1° squares show number of observations in each during the month.

On inset, heavy lines show boundaries of Straits of Florida and of 5° subdivisions of the Caribbean Sea. First number in each subdivision shows 11-year mean temperature for the month. Second number shows mean temperature for the month in 1930. Third number shows number of observations for the month.

conclusions would be difficult to draw if not quite impossible to verify to any accurate degree. The coincidence, however, of extreme conditions—low temperature in the Straits of Florida surface waters and scanty precipitation in the regions receiving ultimately nearly all their rainfall from the Gulf of Mexico and western North Atlantic sources—is interesting in its implications.

Dr. C. F. Brook's analysis of thermograms from the condenser-intake of the *Henry M. Flagler*,[2] paralleling in every respect, as it does, the results from the Weather Bureau records in regard to temperature marches, and agreeing with them in absolute values to well within the limits of differences to be expected in data not completely comparable, lends support to the reality and amplitude of the computed temperature anomaly.

TABLE 1.—*Lengths of "quarter months" used in computing mean sea-surface temperatures*

Length of month	Days of month included in quarter			
	I	II	III	IV
28 days	1–7	8–14	15–21	22–28
29 days	1–7	8–14	15–21	22–29
30 days	1–7	8–15	16–22	23–30
31 days	1–7	8–15	16–23	24–31

[2] This ship, a car ferry plying between Key West and Habana, installed thermographic equipment in 1928, from the records of which equipment Doctor Brooks made his study. Due to lay-overs in dock by the ship, the records were somewhat fragmentary. The study was brought to a close with the June 3–9 record in 1930. The periods available for comparisons in the present writing were: May 27–June 2, 1929; June 17–23, 1929; May 27–June 2, 1930; and June 3–9, 1930. Cf. Charles F. Brooks. Gulf Stream daily thermograms across the Straits of Florida. MONTHLY WEATHER REVIEW, April, 1930, 58 : 148–154; and Charles F. Brooks and Edith M. Fitton. Weekly succession of Gulf Stream Temperatures in the Straits of Florida. Ibid July, 1930, 58 : 273–280.

TABLE 2.—*Mean sea-surface temperatures in the Caribbean Sea and the Straits of Florida for June, 1919–1930*

Year	Caribbean Sea		Straits of Florida	
	Number of observations	Mean temperature	Number of observations	Mean temperature
		°F.		°F.
1919 [1]	65	82.2	32	81.1
1920	208	81.1	25	81.0
1921	169	81.1	54	81.3
1922	181	80.5	98	81.8
1923	348	80.4	97	81.1
1924	347	82.0	109	82.8
1925	570	81.2	141	81.5
1926	468	82.1	138	81.6
1927	399	81.8	143	82.4
1928	691	81.6	167	81.8
1929	839	81.2	186	81.4
1930	658	81.5	147	80.4
Mean (1920–1930)		81.3		81.6

[1] Not used in computations because of insufficient data available.

TABLE 3.—*Mean sea-surface temperatures (°F.) and number of observations, June, 1930*

Quarter	Period	Caribbean Sea				Straits of Florida			
		Number of observations	Mean	Departure from 11-year mean (1920–1930)	Change from preceding month	Number of observations	Mean	Departure from 11-year mean (1920–1930)	Change from preceding month
			°F.	°F.	°F.		°F.	°F.	°F.
I	June 1–7	144	81.2			38	80.2		
II	June 8–15	183	81.5			34	79.6		
III	June 16–22	148	81.7			36	80.2		
IV	June 23–30	183	81.7			39	81.8		
Month		658	81.5	+0.2	+0.5	147	80.4	−1.2	+0.8